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EXAMINER

LUU, THANH X

ART UNIT PAPER NUMBER

2878

DATE MAILED: 08/29/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/654,550

Applicant(s)

IWASA, YOSHIRO

Examiner

Thanh X Luu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 18 June 2002.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 2-5 and 7-16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 2-5 and 7-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

### DETAILED ACTION

This Office Action is in response to amendments and remarks filed June 18, 2002. Claims 2-5 and 7-16 are currently pending.

#### ***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 11, 14 and 15 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. It appears that Applicant has not adequately described an embodiment in which the light-receiving element is inserted in the optical signal transfer device. Page 10 and Figures 4-5 simply mention and show the light-receiving element (67) inserted in contact holes (61a) and bonded to the optical signal transfer device, but not inserted in the optical signal transfer device.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 3, 7, 9 and 14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 3, "the optical fiber" lacks proper antecedent basis.

Regarding claim 7, the claim's dependency is unclear since it is dependent from canceled claim 6. Since its dependency is unclear, the claim will not be examined on its merits.

Regarding claim 9, "the mounting substrate" lacks proper antecedent basis. Furthermore, it is unclear in its given context how a light emitting surface (the transfer device) transfers an optical signal from an arithmetic processing apparatus into the semiconductor chip. That is, an optical signal from an arithmetic processing apparatus would simply fall on a light emitting diode (of the light emitting surface) and the signal would not be able to get to the light receiving element. Furthermore, the light receiving element would receive light from the light emitting diode of the light emitting surface, not the optical signal from the arithmetic processing apparatus.

Claim 14 is indefinite by virtue of its dependency on an indefinite claim.

***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily

published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

6. Claim 16 is rejected under 35 U.S.C. 102(b) as being anticipated by Horwitz et al. (U.S. Patent 5,371,822).

Regarding claim 16, Horwitz et al. disclose (see Figure 2) a semiconductor device, comprising: a semiconductor chip (26) and a light-receiving element (28) in the semiconductor chip for receiving an optical signal, wherein the semiconductor chip is disposed in a first plane; and an optical signal transfer device (30) connected to the light-receiving element for transferring the optical signal into the semiconductor chip, wherein the optical signal transfer device is disposed in a second plane that is spaced apart (above) from the first plane.

7. Claim 13 is rejected under 35 U.S.C. 102(b) as being anticipated by Wills et al. (U.S. Patent 5,119,451).

Regarding claim 13, Wills et al. disclose (see Figures 15 and 19) a semiconductor device, comprising: a mounting substrate (crosshatched surface and 12, 24) and at least one optical signal transfer device (18, 44) disposed in a first plane in the mounting substrate for transferring an optical signal; a plurality of semiconductor chips (10, 42, 46) mounted on the mounting substrate, wherein the semiconductor chips are disposed in a second plane that is spaced apart from the first plane; and a light receiving element (20) formed in at least one of the semiconductor chips and that directly contacts the optical signal transfer device for receiving the optical signal (see

Figure 19), wherein the optical signal is transferred among the plurality of semiconductor chips through the optical signal transfer device.

8. Claims 4 and 2 are rejected under 35 U.S.C. 102(b) as being anticipated by Frazier (U.S. Patent 5,199,087).

Regarding claims 4 and 2, Frazier discloses (see Figure 6) a semiconductor device, comprising: a semiconductor chip (208) mounted on a mounting substrate (204, 210) and a light receiving element (214) formed in the semiconductor chip for receiving an optical signal; and an optical signal transfer device (212, 206), a fiber, embedded in the mounting substrate, wherein the optical signal transfer device directly contacts the light receiving element for transferring the optical signal into the semiconductor chip.

9. Claims 4, 5 and 8 are rejected under 35 U.S.C. 102(b) as being anticipated by Suzuki (U.S. Patent 5,834,841).

Regarding claim 4, Suzuki discloses (see Figures 18A and 18B) a semiconductor device, comprising: a semiconductor chip (112 or 113) mounted on a mounting substrate (111) and a light receiving element (116) formed in the semiconductor chip for receiving an optical signal; and an optical signal transfer device (115) embedded in the mounting substrate, wherein the optical signal transfer device directly contacts the light receiving element for transferring the optical signal into the semiconductor chip.

Regarding claim 5, Suzuki discloses (see Figures 18A and 18B) a semiconductor device, comprising: a mounting substrate (111) and at least one optical signal transfer device (115) embedded in the mounting substrate for transferring an optical signal; a plurality of semiconductor chips (112 and 113) mounted on the mounting substrate; and

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a light-receiving element (116) formed in at least one of the semiconductor chips and that directly contacts the optical signal transfer device for receiving the optical signal, wherein the optical signal (in 115) is transferred among the plurality of semiconductor chips through the optical transfer device.

Regarding claim 8, Suzuki discloses (see Figures 18A and 18B) a semiconductor device, comprising: a semiconductor chip (112 or 113) and a light-receiving element (116) formed on the semiconductor chip for receiving an optical signal, wherein the semiconductor chip is disposed in a first plane; and an optical signal transfer device (115) that directly contacts the light receiving element for transferring the optical signal from an arithmetic processing apparatus (see claims; chips are CPUs) into the semiconductor chip, wherein the optical signal transfer device is disposed in a second plane that is spaced apart from the first plane.

10. Claims 10 and 12 are rejected under 35 U.S.C. 102(e) as being anticipated by Munoz-Bustamante et al. (U.S. Patent 6,259,840).

Regarding claims 10 and 12, Munoz-Bustamante et al. disclose (see Figures 4 and 5) a semiconductor device, comprising: a mounting substrate (7 and 30); at least one optical signal transfer device (51, 54) embedded in the mounting substrate, wherein the at least one optical signal transfer device is adapted to transfer an optical signal; a plurality of semiconductor chips (60, mounted at 31-34) mounted on the mounting substrate; and a light-receiving element (inherent within 60 and chips mounted at 32-34) formed in at least one of the semiconductor chips and that is connected to the optical signal transfer device for receiving the optical signal, wherein the optical signal is

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transferred among the plurality of semiconductor chips through the optical transfer device, wherein the optical signal transfer device is formed in a lattice configuration (see Figure 4) and embedded in the mounting substrate. That is, the optoelectronic chips of Munoz-Bustamante et al. inherently include a light receiving element since optical signals are transferred to and from the chips via the optical pathways provided. Munoz-Bustamante et al. further disclose (see Figure 5) a plurality of selected ones of the optical signal devices extend in a first direction (in the plane of the paper), and wherein a plurality of others of the optical signal transfer devices (represented as circles in the figure) extend in a second direction (out of the paper) different than the first direction and intersect the plurality of selected ones of the optical signal transfer devices.

***Claim Rejections - 35 USC § 103***

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over either one of Frazier or Suzuki.

Regarding claim 3, Frazier and Suzuki disclose the claimed invention as set forth above. Frazier and Suzuki do not specifically disclose a package in contact with and seals the chip and optical signal transfer device. However, using sealant material in semiconductor chip assemblies is notoriously well known. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide a



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seal in the apparatus of Frazier or Suzuki to protect the chip and transfer device from damage.

13. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki.

Regarding claim 11, Suzuki further discloses (see Figures 18A and 18B) the light receiving element is formed in a convex shape on a side opposite to the mounting substrate, and the light receiving element is inserted in the optical signal transfer device to connect the light receiving element to the optical signal transfer device. Suzuki does not specifically disclose the shape being a cylindrical shape. However, the particular type of shape of the light receiving element is a matter of design choice. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide a cylindrical shaped light receiving element in the apparatus of Suzuki, as desired, to more easily fit into the signal transfer device.

14. Claims 9 and 14, as understood, is rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshimura et al. (U.S. Patent 5,757,989).

Regarding claim 9, Yoshimura et al. disclose (see Figure 1) a semiconductor device, comprising: a semiconductor chip (15 or 17) and a light receiving element (16) formed on the semiconductor chip for receiving an optical signal; and an optical signal transfer device (5) connected to the light receiving element for transferring the optical signal into the semiconductor device, wherein the optical signal transfer device is a light-emitting surface that is formed in a mounting substrate. Yoshimura et al. do not specifically disclose the optical signal is from an arithmetic processing apparatus. However, choosing and providing a source of the optical signal is a matter of design

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choice and requires only routine skill in the art. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to obtain the optical signal from an arithmetic processing apparatus in the apparatus of Yoshimura et al. to transfer useful data to the chip for further processing.

Regarding claim 14, Yoshimura et al. further disclose (see Figures 18A and 18B) the light receiving element is formed on a side opposite to the mounting substrate, and the light receiving element is connected the light receiving element to the optical signal transfer device. Yoshimura et al. do not specifically disclose the shape of the light receiving element being a cylindrical shape or being inserted into the transfer device. However, the particular type of shape of the light receiving element and connection configuration is a matter of design choice. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide a cylindrical shaped light receiving element in the apparatus of Yoshimura et al., as desired, to more easily fit into the signal transfer device. Further, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to insert the receiving element into the transfer device in the apparatus of Yoshimura et al. to provide a closer bond between the two elements to thereby reduce ambient radiation and improve detection.

15. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Munoz-Bustamante et al.

Regarding claim 15, Munoz-Bustamante et al. further disclose (see Figures 4 and 5) the light receiving element is formed on a side opposite to the mounting substrate,

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and a coupling element (56, 55) is inserted in the optical signal transfer device to connect the light receiving element to the optical signal transfer device. Munoz-Bustamante et al. do not specifically disclose the shape being a cylindrical shape or inserting the receiving element into the transfer device. However, the particular type of shape of the light receiving element and connection configuration is a matter of design choice. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide a cylindrical shaped light receiving element in the apparatus of Munoz-Bustamante et al., as desired, to more easily fit into the signal transfer device. Further, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to insert the receiving element into the transfer device in the apparatus of Munoz-Bustamante et al. to provide a closer bond between the two elements to thereby reduce ambient radiation and improve detection.

### ***Response to Arguments***

16. Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

17. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within

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TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanh X. Luu whose telephone number is (703) 305-0539. The examiner can normally be reached on Monday-Friday from 6:30 AM - 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank Font, can be reached on (703) 308-4881. The fax phone number for the organization where the application or proceeding is assigned is (703) 308-7722.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

txl  
August 19, 2002

  
Frank G. Font  
Supervisory Patent Examiner  
Technology Center 2800